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ABSTRACT

The effects of instructions for using advance organizers upon the learning and retention of new information were examined. The special instructions explained an organizer's function and directed students to use the advance organizer. An advance organizer treatment, an advance organizer with special instruction treatment, and a no advance organizer treatment were randomly assigned to 71 high school seniors. Immediate and delayed tests were administered and the scores were analyzed using a repeated measures design. While there were no significant differences among any of the groups on the results of the immediate test, females receiving the advance organizers with special instruction treatment performed significantly better on the delayed test than either females receiving the no advance organizer treatment or males receiving any of the three treatments. It was also inferred that females possessed more extensive schemata relative to the content of the new learning than males. It was concluded that instructions for using an advance organizer facilitate the organizer's effectiveness provided that the organizer reflects a schemata of the target group. (Author/GK)

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Improving the Effectiveness of Advance Organizers by Providing Instructions on Their Use During Study

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Advance Organizers

Abstract

In this study the authors examined the effects of instructions for using advance organizers upon the learning and retention of new information. The special instructions explained an organizer's function and directed students to use the advance organizer. An advance organizer treatment, an advance organizer with special instruction treatment, and a no advance organizer treatment were randomly assigned to 71 high school seniors. Immediate and delayed tests were administered and the scores were analyzed using a repeated measures design. While there were no significant differences among any of the groups on the results of the immediate test, females receiving the advance organizers with special instruction treatment performed significantly better on the delayed test than either females receiving the no advance organizer treatment or males receiving any of the three treatments. It was also inferred that females possessed more extensive schemata relative to the content of the new learning than males. It was concluded that instructions for using an advance organizer facilitate the organizer's effectiveness provided that the organizer reflects a schemata of the target group.

Improving the Effectiveness of Advance Organizers by Providing Instructions on Their Use During Study

The problem of presenting material in ways that facilitate storage and retrieval of information has interested teachers and developers of instructional materials for many years. Anderson, Reynolds, Shallert and Goetz (1977) propose a knowledge structure or schema theory of learning in which "the principal determinant of the knowledge a person can acquire from reading is the knowledge s/he already possesses" (pp. 378). In bridging that gap between learners' present knowledge and the new knowledge they are to acquire, Ausubel, Novak, and Hanesian (1978) advocate the use of advance organizers. As part of Ausubel's theory of assimilation, organizers are defined as having "a higher level of abstraction, generality, and inclusiveness than the new material to be learned" (pp. 171). According to Ausubel et al., organizers may be most effectively used in helping the learner establish "a meaningful learning set" and helping the learner relate new learning materials to "specifically relevant aspects of existing cognitive structure" (pp. 41).

Studies involving advance organizers have resulted in inconclusive evidence as to their effect on learning. In 1975, Barnes and Clawson stated that advance organizers generally do not facilitate learning. This conclusion has been supported by a subsequent review (Hartley & Davies, 1976). Anderson, Spiro, and Anderson (1978) suggest that relevant subsuming schemata possessed by readers are implemented by them as a matter of routine and that "the theoretical justification for the advance organizer is quite flimsy" (pp. 439).

On the other hand, recent findings have shown that advance organizers do enhance not only learning and retention, but also transfer (Ausubel, 1978; Luiten, Ames, & Ackerson, 1979; Mayer, 1979; Satterly and Telfer, 1979). Though the subject of advance organizers is still controversial, critics and proponents all seem to agree that further research in the area needs to be conducted.

One primary concern expressed by researchers is the various interpretations of what characterizes an advance organizer. The reason for multitple interpretations, Barnes and Clawson suggest (1975), is that an operational definition of advance organizer does not exist.

Mayer (1979) helps eliminate some of the confusion by providing a checklist to aid in the production of effective organizers, noting that an absolute method for producing advance organizers has not yet been devised. His checklist asks (1) if the organizer allows the learner to generate logical relationships in the new material and/or relates unfamiliar material to familiar, (2) if the organizer is easily acquired and used by the learner, and (3) if it provides the learner with an "organizing assimilative set" which the learner would normally fail to use. If the answer to each of the above questions is "yes," then an adequate organizer has probably been produced (pp. 382).

However, as Lawton and Wanska (1977) note, just because an organizer is designed to enhance meaningful learning, there is no guarantee that the learner will use it. They state that "Ausubel uses the qualifying adjective, 'potential,' and recognizes that an important role of the advance organizer is to alert the learner to appropriate prior knowledge subsumption" (pp. 24). In other words, while an advance organizer can potentially facilitiate and support learning by inducing an initial cognitive structure upon which to base new

knowledge, it does not automatically follow that the learner will use and thereby activate the meaningful learning process.

The results of Slatterly's and Telfer's study (1979) tend to support their suggestion that a learner's present level of sophistication or familiarity with learning strategies may inhibit the use of organizers. Given that a well designed organizer may not ensure active use of that organizer, a potential gap may occur between an organizer's intended use and its actual use. Four of Gagné's instructional events (1977) might be applied in filling that gap, making the use of the organizers a more effective strategy.

The instructional events under consideration are (1) informing the learner of the objective, (2) directing attention, (3) stimulating recall, and (4) providing learning guidance (pp. 285). For the unsophisticated learner, providing some very brief events of instruction may significantly enhance the use of organizers, thereby enhancing the retention of knowledge. The type of instruction is implied by the events presented above. That instruction would consist of (1) telling the learners what an organizer can accomplish, (2) directing the learners' attention to the specific organizer being presented, (3) mentioning other types of organizers with which the learner is familiar, and (4) instructing the learner to use the organizer in studying the new material to be learned.

The purpose of the present study was to investigate the efficacy of two forms of advance organizers on the recall of new material for which schemata could conceivably exist. The major focus of the new material centered on a young man's purchase of 35 familiar food items in a supermarket. One form of advance organizer was a facsimile of a typical restaurant menu. The menu emphasized 12 categorical labels of the different courses one would encounter at a restaurant

such as appetizers, beverages, entrees, and desserts. No specific food items were mentioned at all. The other advance organizer comprised the same menu, but added instructions as to how to use it relative to learning the new material. The "added instruction" was predicated upon the first four of Gagné's instructional events (1977) discussed above. The advance organizers were devised, using criteria advocated by Ausubel et al. (1978) and Mayer (1979).

The dependent variables in this study were the number of items from the new material to be learned that could be recalled on an immediate as well as a delayed test. A number of studies on advance organizers have failed to test for retention beyond a few days - one reason for their lack of significant findings according to Ausubel (1978).

It was hypothesized that the group which received the advance organizer with specific instructions as to how to use it would recall more items from the new material on both the immediate and delayed tests than either the group receiving the advance organizer without instructions or the group receiving no organizer at all. The rationale for this hypothesis is that learners who are unfamiliar with the use of organizers may not properly execute the organizers, resulting in a failure to readily incorporate new ideas into their cognitive structure. Special instructions regarding the purpose and function of organizers may alleviate this problem (Satterly & Telfer, 1979, pp. 177). Also, it has been demonstrated that learners who are cued as to what to look for and how to proceed with the learning task learn more than those who are not given such help (Tulving & Thomason, 1973).

It was also expected that the group which received the advance organizer without instructions would recall more items on both immediate and delayed tests than a control group which received no advance organizer at all. This expec-

tation is congruent with Ausubel's theory that an advance organizer will act upon a schemata that is present within the individual. Since it was posited that all the learners had some form of schemata relative to food, the advance organizer should have some effect.

Finally it was expected that females would remember more specific food items from the new material as well as more restaurant categories than males since they may possess an enhanced schemata for food as a result of the enculturation patterns predominating in this society (Secord, Gaa & Liberman, Note 1; Cole & Scribner, 1974). A covariate of Grade Point Average was used to adjust for possible bias in the results due to unknown factors not eliminated by random assignment of treatment to groups.

Method

Participants

The participants for this study were 79 twelfth grade students at the Developmental Research School at Florida State University in Tallahassee, Florida. Due to student absence for the delayed test, the final sample comprised 71 students, 29 males and 42 females. The school population generally constitutes a normal range in ability levels and representative distribution of ethnic components of Florida's population. Consent to participate in research studies was given by students and their parents prior to students' enrolling in the Developmental Research School.

Materials

There were three categories of materials, those containing the new learning, the two forms of advance organizers, and two tests (one to determine recall of new information and one to determine recall of the restaurant categories from the advance organizer). The tests were used in determining both immediate and delayed retention. The new learning was represented in a short narrative

about a young man's trip to the supermarket to purchase 35 items of food. There was some irrelevant information included such as the time of the visit, the young man's feelings about some of the food items, and his subsequent plans for the rest of the evening.

The advance organizers took two forms. One was simply a facsimile of a restaurant menu denoting only 12 categories of foods served, not specific food items. The other comprised the same facsimile with the addition of a short paragraph about how to use the menu to remember the new material. The instructions mentioned a filing cabinet as a device for storing information in a systematic manner. It suggested that the student use the restaurant facsimile as a means for mentally "filing" information under the appropriate category to facilitate recall later.

The test for recall of information from the supermarket narrative was administered before the test for recall of categories, since it was believed that the category recall test could act as a cue for the recall test of food items. In the recall test for food items, the students were asked to write down as much as they could remember from the supermarket narrative. After that they were asked to write down as many categories of foods served at a restaurant as they could remember. The immediate and delayed tests for both food items and categories were identical.

All the materials were formatively evaluated with three high school seniors from a similar population. On the basis of this formative evaluation, minor changes were made in the supermarket passage only.

Procedures

There were three treatments randomly assigned to the participants. Treatment 1 constituted a control group. This group was given only the supermarket narrative to read. The students receiving Treatment 2 were given the

supermarket narrative and the menu facsimile. Students comprising Treatment Group 3 were provided with the supermarket narrative, the menu facsimile, and a set of instructions as to how to use the menu as a means of learning the new material. All treatment groups were directed to read the material carefully since they would be tested on it afterwards.

The instructions as to how to proceed through the materials were written to minimize the amount of verbal instructions required. Explicit instructions were given to "not look back" once the student had turned the page. The students were also given a time limit of 15 minutes for the food item recall test. Most students finished the test in 10 minutes.

The delayed test was administered 9 days later at the same time of the day and in the same location. Students who were not present for the delayed test were dropped from the sample.

Research Design

An analysis of covariance for treatment (3 levels), sex (2 levels), and time of test (2 levels - immediate and delayed) was used with the control factors being test scores and student grade point average. This was used to detect bias due to ability. An analysis of variance for treatment, sex, and time of test was also used for the recall of restaurant categories. A predetermined list of correct items and acceptable synonyms was constructed to score both forms of tests. Alpha level was set at .05.

Results

The tests over the new material were scored on a scale of 0 - 35, with 35 constituting a perfect score. Extreme scores were examined to determine whether they posed a threat to the normal distribution of scores. No such threat was found, thereby validating the assumption of normal distribution required for

ANOVA and ANCOVAR. Inter-judge reliability for the scoring was .94 indicating that the rating of the tests was valid.

Homogeneity of variance tests were undertaken at each level of analysis using an F_{max} test. No significant results were obtained, revealing that the assumption of homogeneity of variance was met for both ANCOVAR and ANOVA with a repeated measures design.

The results indicated that while grade point average (GPA) was positively correlated with the score, $r = .51$, there were no significant differences between the covariate means for either Treatment or Sex. This indicated that differences in score means for both of these factors were not due to ability.

As indicated in Figure 1, there was a significant interaction between Treatment and Sex, $F\ (2,141) = 5.89$, $p < .05$. The presence of a significant

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Insert Figure 1 about here

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overall F ratio permitted the use of Fisher's Least Significant Difference Test for means. Using this test, it was found that females in Treatment Group 3 recalled significantly more specific food items than females in the other two groups on the delayed test. This lends support to the idea that, over time, an advance organizer is an aid to those already possessing a schemata for recall of information.

Insert Table 1 about here

There was a significant main effect for Sex in the recall of restaurant categories, F (1,141) = 3.95, $p < .05$. There were no significant differences among the means for Treatment Groups for recall of restaurant categories.

Insert Table 2 about here

The Eta squared statistic was computed for Treatment and Sex interaction. This interaction accounted for 6% of total variance. Despite the significant result, Sex accounted for only 2% of the total variance in the recall of categories.

Discussion

The results of this study do not appear to support the main hypothesis that advance organizers with special instructions aid the storage and retrieval of new information. However, since an a priori decision to compare Treatment Groups had been made, the results for males and females in the three groups were examined separately. Those examinations indicated that Treatment Group 3 (advance organizer with instructions, AOI) performed significantly better over time in the case of females, t (13) = 2.485, $p < .05$ (see Table 1). However, there were no significant differences between the means for Treatment Groups 3 and 2 (advance organizer, AO) and between Treatment Group 2 (AO) and 1 (control, C).

These results lend support to the notion that an important factor in the effectiveness of advance organizers is directing the student's attention to the advance organizer. This is congruent with Gagné's events of instruction (Gagné, 1977) as well as the Satterly and Telfer study (1979) suggesting that students must be aware of an organizer's potential during learning in order for it to

effectively enhance that learning. These results also lend support to Ausubel's assimilation theory that advance organizers aid in the retention of information.

There were no significant differences among the means of males in either the immediate or delayed test results (see Table 1). The presence of the higher mean score in Treatment Group 1 (C) is interesting, however, and difficult to explain. It would appear that the instruction provided in Treatment Group 2 (AOI) constituted an interference factor.

The hypothesis that females would score significantly better than males in recalling food items was supported, t (29) = 2.30, $p < .05$. It seems possible that since females also scored higher in recall of restaurant categories, t (42) = 2.034, $p < .05$, the females in this sample possessed more extensive schemata relative to food in relation to meal planning than the males. It should be noted that the factor of total knowledge about food was not assessed in this study. Therefore it cannot be concluded from these results that females know more about food generally than males.

The lack of significant differences between the means of Group 2 (AO) and Group 1 (C) for females combined with the significant difference over males in recall of restaurant categories raise questions about whether schemata are "routinely brought to bear" in learning new material as Anderson et al. (1978) suggest. There were no significant differences among the means for females in different treatments in respect to categories, suggesting that schemata for the females in Group 3 (AOI) was not significantly different from those in Group 1 (C).

One further explanation for the Treatment Sex interaction could possibly lie in the degree to which the instructions were followed by the females in Group 3 (AOI). There is some evidence that females' need for affiliation

impacts upon following directions (Travers, 1977). Their need for approval seems to result in greater attention to instructions in test situations.

A note of caution should be mentioned here regarding the reliability of the testing situation. Two thirds of the sample was retested under almost identical conditions to the immediate test. However, the remaining third was delayed a further day before the second test was administered. The authors believed that since the treatments were randomly assigned, the effect of the further delay would be mitigated to some extent.

The implications of this study for teaching and designing instructional materials are worth consideration. While Mayer (1979) developed a useful list of characteristics that are generally included in an advance organizer and suggests aids in the production of effective organizers, this study suggests that an additional step, an instructional component that should be used in conjunction with the organizer, is useful in order for an advance organizer to become an effective preinstructional strategy.

The results also lend credence to Ausubel's contention that advance organizers should be constructed with the student's background in mind, and that more sophisticated methodologies involving mapping "existing concepts in cognitive structure" should be investigated (Ausubel, 1978, p. 252). It would appear that advance organizers do operate differentially relative to schemata, and teachers would find it worthwhile to attempt to determine the extent of their students' schemata when devising advance organizers for specific content.

Future research in this area might attempt to control more carefully for the presence of differentiated schemata in learners as well as account for differing levels of learner sophistication in the use of advance organizers as instructional strategies in learning new material.

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Table 1

Mean Scores for Males and Females on Immediate and Delayed Tests of Lesson Content in Different Treatment Groups

Sex	Test	Group 1	(n)	Group 2	(n)	Group 3	(n)
Males	Immediate	11.0	(10)	6.7	(9)	6.7	(10)
	Delayed	3.3		3.5		1.7	
Females	Immediate	9.3	(14)	12.9	(15)	14.0	(13)
	Delayed	3.3		6.7		8.5*	

*$p < .05$

Table 2

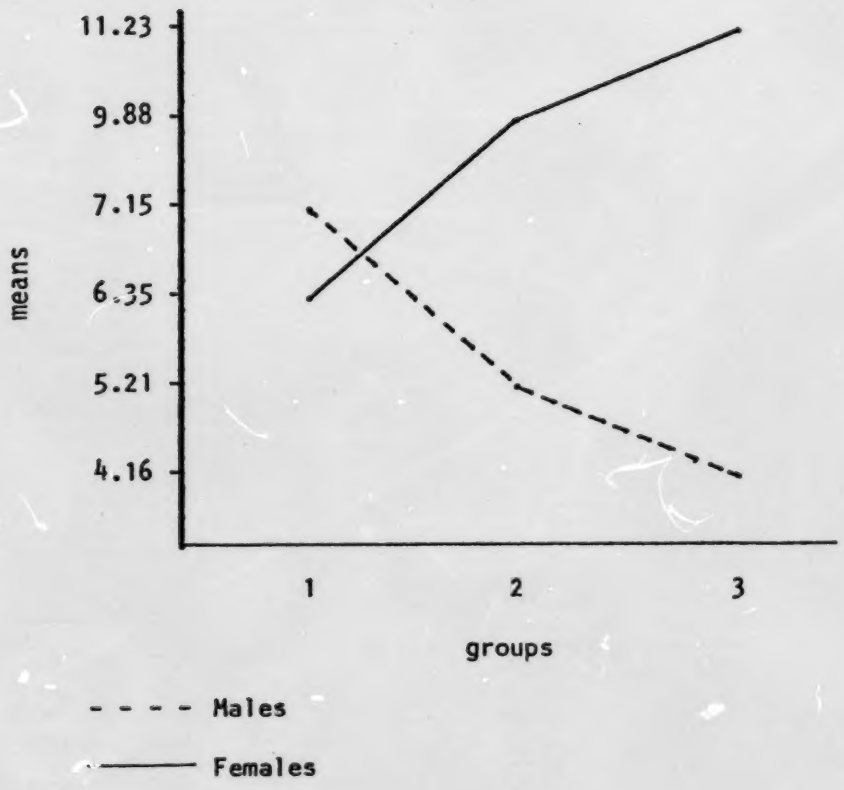
Mean Scores and Standard Deviations for Males and Females for Recall of Restaurant Categories

Sex	n	$\bar{X}$	SD
Males	29	4.2	1.9
Females	42	4.9*	2.1

*$p < .05$

Figure Caption

Figure 1. Means for males and females for combined test scores of immediate and delayed tests of lesson content.


11.23
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means
1
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groups
Males
Females